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ABSTRACT

The effects of orienting activities and practice on performance and student behaviors in a cooperative learning environment were studied with 80 graduate education majors in an educational psychology course. A 2 x 2 factorial design was used, with orienting activity (advance organizer versus objectives) and type of practice (verbal information versus intellectual skill) as the independent variables. Dependent variables were achievement and student behaviors. Students in the treatment groups (combinations of organizers and practice) received instructional television lessons with workbook activities. Helping and on-task individual and group behaviors were observed. The type of practice had a significant effect on performance, with those receiving skills practice performing better than those receiving information practice. Practice alone did not influence knowledge acquisition, but it was influenced by a combination of practice and orienting activity, with students receiving information practice and objectives outperforming all subjects on the knowledge section of the posttest. Orienting activity and type of practice also influenced student behaviors. Implications for instructional technologists are discussed. (Contains 15 references.) (SLD)

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Title:

Effects of Instructional Elements in a Cooperative Learning Setting

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In recent years, Educational Technologists have examined how to implement cooperative learning strategies in settings that were originally designed for individual learning. Classroom research generally indicates positive results in favor of cooperative learning (Johnson & Johnson, 1989; Sharan, 1980; Slavin, 1990). However, research that examines how to implement cooperative learning with media has produced mixed results. Some researchers report that cooperative learning positively affected performance in CAI lessons (Dalton, Hannafin, & Hooper, 1989; Johnson, Johnson, & Stanne, 1985), while others have not found a significant effect for performance when learners used cooperative CAI (Carrier & Sales, 1987). Research on cooperative learning and instructional television suggests that when compared to individual strategies, cooperative learning does not always increase learning and motivation (Klein, Erchul, & Pridemore, 1993). Other studies report that performance in these settings is influenced by one's affiliation motives (Klein & Pridemore, 1992).

Results obtained from using cooperative learning with media may be influenced by the instructional strategies employed in these studies. Different instructional elements incorporated within lessons could influence the effectiveness of using cooperative learning with these media. Two instructional elements which may influence the success of cooperative learning with media are orienting activities and practice. Both have influenced learning outcomes in a variety of settings (e.g., Ausubel, 1960; Ho, Savenye, & Haas, 1986; Phillips, Hannafin, & Tripp, 1988; Salisbury, Richards, & Klein, 1985).

The purpose of the current study was to investigate the effects of orienting activities and practice on performance and student behaviors in a cooperative learning environment.

Method

Design. A 2 X 2 factorial design was used in this study, with orienting activity (advance organizer versus objectives) and type of practice (verbal information versus intellectual skill) as the independent variables. The dependent variables were achievement and student behaviors.

Subjects. Subjects were 80 graduate education majors (16 males, 64 females) at a large southwestern university enrolled in a required course in educational psychology. Subjects were stratified by sex and randomly assigned to one of 16 cooperative learning groups. Each group was constructed to include one male and four female students. Each group was randomly assigned to one of four instructional treatments (advance organizers/information practice, advance organizers/skills practice, objectives/ information practice, objectives/skills practice).

Materials & Procedures. All groups received three instructional television lessons from the series Instructional Theory: A nine lesson mini-course (Gerlach, 1973). Each lesson included a videotape and a workbook that provided instruction on the topics of stating objectives, developing assessment items, and designing effective practice activities. Each videotape was divided into several segments which presented information and examples on the content of the lesson. After each segment, the videotape instructed subjects to turn to a workbook for practice and feedback on the content presented in that segment. Variations in the materials occurred in the workbooks. Each workbook provided either an advance organizer or a list of instructional objectives for the lesson. The advance organizer provided students with an overview of the lesson for that day. The following is an example of the advance organizer provided to students for the lesson on writing objectives.

> Perhaps the best known component of the systematic approach to instructional design is the instructional objective. Since the early 1960's, many educators have written instructional objectives. An objective is a statement of what students will be able to do after they have completed a unit of instruction. In this lesson you will be learning how to use objectives in order to improve your instruction.

The other set of workbooks provided a specific list of the instructional objectives for each lesson. The following is an example of the objectives provided to students for the lesson on writing objectives.

1. Explain why well stated objectives are essential to the development of effective instruction.
2. Identify examples of properly stated objectives, given examples of properly and improperly stated objectives.
3. Name the desired characteristics of objectives that are missing, given an improperly stated objective.

The workbooks for each lesson also differed on the type of practice given after each video segment. Eight of the 16 cooperative learning groups used workbooks that provided practice on verbal information presented in each videotape. The other eight groups used workbooks that provided practice on the intellectual skills. For example, Segment 4 of the lesson on objectives-based assessment provided information and examples on paper-and-pencil tests, interviews, and observations of student performance or product. Practice on the verbal information for this segment required students to summarize the key information in the videotape by listing the three types of objectives-based assessment. Practice on the intellectual skills for this segment required students to describe the best type of objectives-based assessment for the objective of sculpting a human head based on criteria discussed in an art class. After each practice question, written feedback was provided.

Students were provided with each lesson over three consecutive days. While students worked through the lesson, an observer watched the groups and recorded student behaviors Three days later, each student completed a constructed response posttest in their regular class to evaluate individual student mastery of the three lessons.

Criterion Measures. A paper-and-pencil posttest that consisted of 22 short-response items was used to measure performance. This posttest was divided into two sections. The first section contained 14 intellectual skill items to evaluate application of lesson content. The second section of the posttest contained eight verbal information items to evaluate knowledge of lesson content. Both sections of this test were worth a total of twenty points each. Individual answers to each item were checked against a scoring key and points were assigned for each response. An item was worth one point unless it required a multiple response. One person scored all of the items on this test. The Kuder-Richardson internal-consistency reliability of the posttest was .74 for subjects in the present study.

Student behaviors were observed during each of the three lessons and field notes were recorded by two observers. After data collection had occurred, a classification scheme for the field notes was developed based on research findings from Webb (1982, 1987). Webb

suggested that student behaviors in small groups can involve on-task versus off-task interactions, helping behaviors, and working alone. The classification scheme developed for the current study identified four sets of student behaviors, including (1) helping behavior (asking for help, giving help when asked, giving unsolicited help), (2) on-task group behavior (taking turns, sharing materials, group discussion of content), (3) on-task individual behavior (assuming control, taking notes, working alone), and (4) off-task behavior (talking to other about something unrelated to the lessons and non-verbal actions such as reading a newspaper).

Using this classification scheme, both observers examined all of the field notes to calculate the total number of times these behaviors occurred for each of the 16 cooperative learning groups. Reliability of observations was based on both observers having similar totals for each set of student behaviors. The inter-rater reliability between observers was .84 for helping behaviors, .84 for on-task group behaviors, .79 for on-task individual behaviors, and .82 for off-task behaviors.

Data Analysis. MANOVA was used to analyze performance data. Individual student scores on both sections of the posttest were combined for this analysis. MANOVA was followed by univariate analyses on the knowledge and application portions of the posttest. Alpha was set at .05 for these statistical tests. MANOVA was also used to analyze each of the four sets of student behaviors. These behaviors were considered as a group-based measure in these analyses since a combined score was obtained for subjects in each cooperative learning group. Alpha was set at .05 for the multivariate tests. MANOVA was followed by univariate analyses on the student behaviors in a set. To account for the possibility of inflated statistical error, alpha was set at .015 for the univariate analyses.

Results

Performance. MANOVA revealed a significant interaction between orienting activity and type of practice, [$F(2, 70) = 3.87$, $p < .05$]. Univariate analyses revealed that the interaction was significant for the knowledge portion of the posttest, [$F(1, 71) = 4.70$, $p < .05$]. This interaction was disordinal in nature. Sheffe' multiple comparison tests revealed that subjects who received objectives and information practice obtained significantly more knowledge ($M = 11.6$) than those who received advance organizers and verbal information practice ($M = 9.4$), [$F(3, 75) = 3.27$, $p < .05$]. Sheffe' tests also indicated that subjects who received objectives and information practice obtained significantly more knowledge ($M = 11.6$) than those who received objectives and intellectual skills practice ($M = 9.3$), [$F(3, 75) = 3.57$, $p < .05$].

In addition to the interaction, MANOVA indicated a significant main effect for type of practice, [$F(2, 70) = 6.84$, $p < .05$], but not for orienting activity. Subjects who worked in groups that received skills practice achieved higher overall posttest scores ($M = 23.4$) than those who received information practice ($M = 21.4$). Univariate analyses revealed that subjects who received practice on the intellectual skills presented in the lessons performed significantly better on the application portion of the posttest ($M = 13.0$) than subjects who received practice on the verbal information ($M = 10.9$), [$F(1, 71) = 8.54$, $p < .05$].

Helping Behaviors. MANOVA indicated that the type of practice given to students significantly affected their helping behaviors, [$F(3, 10) = 6.59$, $p < .05$]. Follow-up univariate analyses indicated that students who received practice over the skills presented in the lesson gave significantly more help to their fellow group members ($M = 2.13$) than students who received practice over the information ($M = 0.5$), [$F(1, 12) = 15.36$, $p < .01$].

On-task Group Behaviors. MANOVA indicated that type of practice [$F(3, 10) = 7.28$, $p < .01$] and orienting activity [$F(3, 10) = 4.23$, $p < .05$] had a significant effect on students' on-task group behaviors. Follow-up univariate analyses indicated that students who received skills practice discussed significantly more of the lesson ($M = 9.75$) than students who received information practice ($M = 4.88$), [$F(1, 12) = 21.83$, $p < .01$]. In addition, students who received objectives discussed significantly more of the lesson ($M = 9.25$) than students who received advance organizers ($M = 5.34$), [$F(1, 12) = 13.79$, $p < .01$].

On-task Individual Behaviors. MANOVA indicated that the type of practice given to students significantly affected their on-task individual behaviors, [$F(3, 10) = 18.26$, $p < .05$]. Follow-up univariate analyses indicated that students who received information practice took more notes on the lesson ($M = 6.63$) than students who received skills practice ($M = 0.5$), [$F(1, 12) = 62.63$, $p < .01$].

Off-task Behaviors. MANOVA did not indicate a significant effect for type of practice nor orienting activity when off-task behaviors were analyzed. Furthermore, a significant interaction between type of practice and orienting activity was not found.

Discussion

The purpose of this study was to investigate the effects of orienting activities and type of practice on performance and student behaviors. Subjects assigned to cooperative learning groups received information, examples, practice, and feedback from three instructional television lessons. Each lesson included specific orienting activities (advance organizers or objectives) and different types of practice (verbal information or intellectual skills).

Results indicated that the type of practice provided to students had a significant effect on performance. Subjects who worked in groups that received skills practice performed better than those who received information practice. Examination of each section of the posttest suggested that performance on application items was affected by type of practice. While type of practice by itself did not influence knowledge acquisition in the present study, it was affected by a combination of type of practice and orienting activity. Subjects who worked in groups that received information practice and objectives outperformed all other subjects on the knowledge portion of the posttest.

A possible explanation for these findings may be due to the nature of the instructional elements provided during the lessons and the subsequent performance measure. Students in groups who received skills practice had the opportunity to perform tasks similar to those required on the application items. This practice strengthened student ability to apply concepts presented in the lessons. However, students who received information practice only had the opportunity to rehearse the knowledge provided in the lessons. Providing lesson objectives to these students may have been necessary to direct their attention and selective perception to relevant lesson content.

In addition to performance, orienting activity and type of practice influenced student behaviors in the current study. Groups given objectives discussed significantly more content than groups given advance organizers. This result may have occurred because subjects had extensive experience with using instructional objectives as a study tool and little experience with implementing advance organizers. While objectives influenced group behaviors, type of practice had a stronger affect on student behaviors. Groups who received skills practice

exhibited significantly more helping behaviors, more on-task group behavior, and less individual behavior (taking notes) than groups who received knowledge practice. These results likely occurred because groups who were given skills practice found the lessons more interesting and engaging than those who received information practice.

This study has some implications for those who design instruction. The current findings suggest that instructional technologists can increase performance and student interaction by employing high-level practice and specific orienting activities when using cooperative learning with media originally designed for individual learning. Systematic application of the appropriate instructional elements in these settings will increase the success of cooperative learning.

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